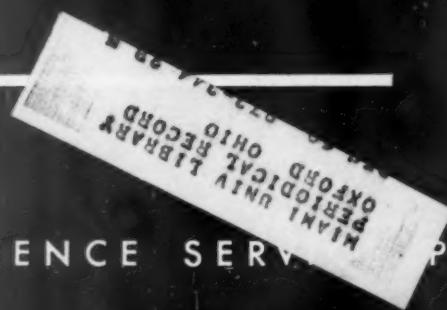


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LINGUISTICS

Machine Translation Seen

Russian is being analyzed by "predictive analysis," a method that may provide automatic translation and an approach to design of automatic programming for computers.

EXPERIMENTS in automatic translation at Harvard University have shown that the structure of the Russian language—its grammar or syntax—is much simpler than had previously been thought.

Russian syntactic structures have "a hitherto unsuspected degree of simplicity, regularity and universality," Prof. Anthony G. Oettinger of the Harvard Computation Laboratory, Cambridge, Mass., reported to the National Symposium on Machine Translation at the University of California, Los Angeles.

Sentences in Russian are now being analyzed for their structure on the Harvard UNIVAC computer using a simple, yet powerful, method known as "predictive analysis."

The predictive analysis of language at Harvard, Prof. Oettinger explained, is based on "brilliant fundamental work" by Mrs. Ida Rhodes of the applied mathematics division of the National Bureau of Standards, Washington, D. C.

Predictive analysis can be described as a series of educated guesses, in which each word in the sentence predicts the most likely grammatical form of the following words. Alternative guesses are stored in a special hindsight section of the machine's memory and are investigated only if later words in the sentence show that the first guess was wrong.

Predictive analysis methods are used in conjunction with the Harvard automatic Russian-English dictionary on magnetic computer tape, which now contains entries for about 15,000 words occurring in mathematical and electronic texts.

Russian sentences are fed directly into the computing machine without preliminary editing. The output of the machine is a printed analysis of the grammatical role of each word in the sentence, supplied by the predictive analysis computer program.

The Russian-English dictionary also provides a list of the English equivalents of each Russian word and of all the possible grammatical roles that the particular form of this word may take.

This is not yet automatic translation, Prof. Oettinger emphasized, but it is a long step toward the goal. Right now, predictive analysis is a most powerful tool for learning more about the structure of languages.

The problem of the analysis of syntax is just the same as the "parsing" exercises for diagramming sentences that are familiar to most persons from their school days. Syntactic analysis is not concerned with the meaning of the words in the sentence, but with the questions: Is this a complete sentence? Which word is the subject of the sentence? Which is the verb? What grammatical roles do the rest of the words play?

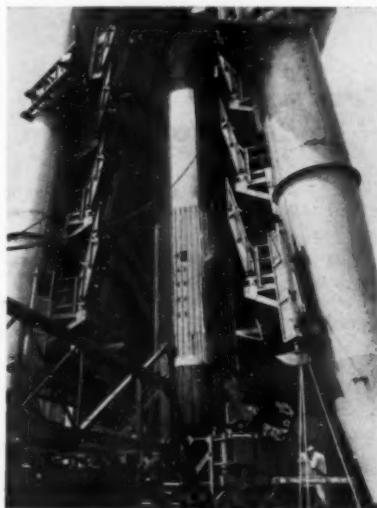
The problem is further complicated by the fact that many word forms can play different grammatical roles in different sentences. This is true even in a highly inflected language like Russian.

Any method of analyzing a sentence, whether in Russian or English or any other language, results in a diagram that looks like a tree, with clauses, phrases and modifying words branching off the main stem of the sentence, Prof. Oettinger said. When a computing machine analyzes a sentence, this tree structure must be expressed as a string of symbols lying in a straight line.

He noted, however, that a human also receives a sentence as a straight-line string of words.

The predictive analysis technique chooses the correct tree diagram for each sentence by working through the sentence from beginning to end—just as the human reader does.

Subsidiary phrases and clauses are treated as structures "nested" within the main sentence, and several levels of nests-within-nests are permitted. By predicting the form of each word on the basis of the word immediately preceding, predictive analysis is able to set forth the grammatical rules of the language with extraordinary simplicity and clarity, the scientist said.



BLUE STREAK—Britain's ballistic missile, Blue Streak, being tested at Hatfield, Hertfordshire, England, is 70 feet long and 10 feet in diameter. It is designed to carry thermonuclear warheads to surface targets from underground launching sites.

The ability of predictive analysis to handle "nested" structure within a sentence means that when a sentence contains a construction that is not provided for in the machine program, the machine will analyze all of the sentence that it can, and then make a note of which part of the sentence cannot be analyzed.

To the experimenter, this is a red flag. Either the input sentence is in error, or its grammatical form is not adequately described in the rules of the machine program. Thus the machine can be made to indicate automatically the places where the grammatical rules of analysis are not complete.

Prof. Oettinger said linguists are already showing much interest in the new machine technique as a convenient way of discovering the rules governing rare grammatical constructions that have gone unnoticed in conventional linguistic analysis.

The Harvard project for the predictive analysis of Russian is not yet complete, Prof. Oettinger said, and not all of the resources of the technique have been fully exploited. Theoretical work seems to show that predictive analysis can work for English and for any other natural language. Prof. Oettinger also suggested that predictive analysis may provide an approach to the design of systems of automatic programming for computing machines.

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BIOLOGY

Turtle Immune to Man-of-War's Stinger

WHY THE POISONOUS stingers of the Portuguese man-of-war, so injurious to man and fish, do not affect the loggerhead turtle is still an unsolved mystery.

The Portuguese man-of-war, a brilliantly colored animal, or group of animals, that floats by means of an air sac in the warm waters of the Gulf of Mexico, possesses masses of fine hanging tentacles. These tentacles, sometimes 30 to 40 feet long, are equipped with stingers that can penetrate a rubber glove and presumably even the hard shell of a crab's leg.

Wherever a tentacle touches human flesh, a painful red welt is raised like that left by the lash of a whip.

The loggerhead turtle is reported to eat the man-of-war and seems to be peculiarly immune to the latter's potent toxin. The man-of-war's tentacles, which cling tightly to skin, gloves, glass containers, and even the polished surface of steel scissors, are easily swallowed and digested by the loggerhead.

Because the adult turtle can eat the man-of-war, researchers have thought there might be protective antibodies in the turtle's blood acquired by contact with the man-of-war early in life.

However, experiments designed to test this hypothesis and reported by Dr. Charles E. Lane and Eleanor Dodge Wangersky of the University of Miami's Marine Laboratory in *Nature* (185, 330, Jan. 20, 1960), suggest that the loggerhead turtle lacks the blood immune bodies that might explain its apparent insensitivity to the toxin.

Science News Letter, February 13, 1960

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GENERAL SCIENCE

USSR Has Faith in Science

"THE SOVIET citizen, Government and Mr. Khrushchev have more faith in science and technology than in Marxism," Dr. John Turkevich, who will serve this summer as acting U.S. scientific attaché to the USSR, believes.

This change of faith may hold a key to peace, he said. The Princeton University chemist spoke at a seminar for science writers at Ardsley-on-Hudson, N. Y., sponsored by the National Science Foundation.

He said the Soviet people do not tell visitors the USSR will better the U.S. because of Communist philosophy but because of scientific advances.

"Thank God for that," Dr. Turkevich said.

Dr. Turkevich's father, an immigrant from Russia, is an American archbishop of the Russian Orthodox Church.

The USSR's proletariat revolution did not liquidate the intellectual influence, Dr. Turkevich said. In fact, today the scientist is riding a great wave of respect.

Scientists foster East-West exchanges that may aid peace, he said, while blind faith in Communist ideology prevented Western ideas from getting into the USSR.

Dr. Turkevich estimates he talked to 40,000 people—including Premier Khrushchev—while lecturing at the recent U.S. exposition in Moscow. He speaks Russian fluently.

He said he found "tremendous affection and admiration for the people of the United States" among Soviet citizens. "Some of this admiration stems from our scientific and technological advances."

In another session, Dr. Frank Fremont-Smith, medical director of the Josiah Macy Jr. Foundation, said specialists attacking the

VITAL STATISTICS

Census Taker Returns If You Are Not at Home

IF YOU ARE NOT home when the census taker calls in April, do not worry about it. The census taker will come again.

You should retain the form that will have been mailed to you late in March, even though your whole family may be hospitalized.

After making several tries to reach you, the census taker will leave a form for you to fill out and mail in when you return home. The census taker will come around again when the form is mailed in.

At that time, the census taker will pick up the advance questionnaire that was mailed to you in March.

Persons in hospitals will be checked on by census takers and the information thus gathered will be referred to the proper census district. Permanent inmates of various institutions will be considered residents and the census taker will count them as living at those institutions.

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same problem from different backgrounds benefit from free-wheeling bull sessions.

He said a chemist and a physicist working separately on the same general problem are often antagonistic. One listens with a chip on his shoulder when the other makes a formal presentation at a scientific convention.

The productive exchange of ideas often comes at these conventions only after the formal part is over and the scientists meet in give-and-take discussions.

Science News Letter, February 13, 1960

SCIENCE NEWS LETTER

VOL. 77 FEBRUARY 13, 1960 NO. 7

Edited by WATSON DAVIS

The Weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N St., N.W., Washington 6, D. C., North 7-2255. Cable Address: SCIENSERV. Subscription rates: 1 yr. \$5.50; 2 yrs., \$10.00; 3 yrs., \$14.50; ten or more copies in one package to one address, 7½ cents per copy per week; single copy, 15 cents, more than six months old, 25 cents. No charge for foreign postage.

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Printed in U.S.A. Second class postage paid at Washington, D. C. Established in mimeograph form March 13, 1922. Title registered as trademark, U. S. and Canadian Patent Offices. Indexed in Reader's Guide to Periodical Literature, Abridged Guide, and the Engineering Index. Member Audit Bureau of Circulation.

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PHYSICS

Reports on Radiation Belts

The earth's radiation belts will not hurt man in his flight into space, says scientist who discovered them. Subsequent work has complemented theories already set forth.

DR. JAMES A. Van Allen has solidly refuted any notion that other scientists are weakening his original picture of the earth's natural radiation belts.

The State University of Iowa physicist, who first observed the banana-shaped radiation zones, said subsequent work, including Soviet investigations, "has only complemented our theories—and in no case I know of has contradicted them."

Some scientists have feared the high energy electrons in the inner of the two radiation zones would mean a harmful overdose of radiation for astronauts moving through the zone. Center of the inner zone lies some 2,200 miles above the earth and is "steady as a rock," Dr. Van Allen said.

Russian scientists, who occasionally have claimed they discovered the radiation zones before Dr. Van Allen did, have recently made announcements tending to distort the belts as originally outlined by the American physicist. In addition, some American investigators have been tentatively redrawing the Van Allen belts.

Dr. Van Allen delivered the 19th Richtmyer Memorial Lecture of the American Association of Physics Teachers at a joint meeting with the American Physical Society in New York. He stressed that he did not

believe the radiation belts would cause much trouble for properly planned space travel.

He said definitely that space vehicles "clad with only a millimeter of steel—and I think they would need that much structure just to get off the ground—will enable a quick path through the radiation zone without biological effects."

He estimated the quickest path would be four to six hours, easily within the capability even of a satellite, which moves slower than the speed needed to escape the earth. Dr. Van Allen gauged the thickness of the inner radiation belt at about 1,000 miles.

Fresh from his Iowa City monitoring station, Dr. Van Allen said continuing data transmitted from Explorer VII have "added definitiveness to the indefinite" qualities of the outer radiation zone.

He said his Iowa team had noted "striking fluctuations" in the intensity of the belt and also indications that it is moving towards and away from the earth as much as a distance equal to half the earth's radius.

Explorer VII is making five passes a day during which the Iowa City station is able to extract from five to 15 minutes of information on each pass.

Dr. Van Allen said his group is readying a new satellite to go up "in the near future

but not before March" for a more detailed look at the make-up of the outer belt of radiation. Only low energy electrons have been found in it thus far, but the Iowa investigator thinks it also contains low energy protons.

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TECHNOLOGY

Antenna Reflectors Warn Free World From Arctic

See Front Cover

A RADAR system with antenna reflectors "bigger than a football field" is being installed in the Arctic to give a 15-minute warning in case of missile attack on the North American continent.

The antenna reflectors, seen in the background of the cover picture of this week's SCIENCE NEWS LETTER, are 165 feet high and 400 feet long. They are built to withstand a six-inch coating of ice in winds up to 185 mph. The reflector surface is made of 2,240 panels bolted to the truss structure.

A total of 20 backstays and 20 trusses, seen in the foreground of the picture, support each of the 1,500-ton reflectors. Each backstay is 42 inches in diameter and weighs seven and a half tons. Ten thousand cubic yards of concrete were poured in the foundation footings for the antenna reflector supports.

The antennas are being installed by the General Electric Company, Syracuse, N. Y., at the U. S. Air Force's Ballistic Missile Early Warning System, Site 1.

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ROENTGENOLOGY

Hand and Wrist X-Rays Identify Living or Dead

AN X-RAY FILM of a human wrist or hand can provide "conclusive proof" of a person's identity, a Stanford University School of Medicine scientist reports.

Individual bones of the hand and wrist differ enough from one person to another that if no other marks are available—such as fingerprints or dental work—the person can be identified, Dr. William Walter Greulich reports in *Science* (131, 155, Jan. 15, 1960).

A study of hand X-rays of the same individuals, from early childhood over many years, shows that the skeletal features useful for identification usually are fixed during late adolescence and remain relatively unchanged until at least well into the thirties. Identification is based on the over-all pattern of some 27 complete bones and parts of two others, the radius and ulna of the arm.

There were also enough similarities between one person's right and left hand to permit successful pairing of the X-rays, Dr. Greulich reports.

The differences in skeletal features appear in various groups, including American Indians and American-born Japanese.

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PORTRAIT SEISMOGRAPH SYSTEM—For surveying shallow rock formations, Sinclair Research Laboratories, Inc., Tulsa, Okla., developed this miniaturized seismograph system that works to a depth of 2,000 feet. The equipment can be carried by two men. Al C. Reid (left) is making instrument settings while Lester J. Smith (right) stands by to operate the data recording camera.

GENERAL SCIENCE

AEC Has Busy Year

A NEW PLASTIC with highly desirable qualities emerged last year on a commercial basis from research sponsored by the Atomic Energy Commission.

The new fluorocarbon plastic—unobtainable through customary chemical processes—has bright, sunfast colors. It has high chemical resistance plus an adhesive, bondable surface.

It was produced by irradiation with a cobalt-60 gamma source in experiments carried out under the AEC's high-intensity radiation development program.

Development of the plastic was just one of many advances cited by the AEC in its Annual Report to Congress for 1959.

Another highlight was the shift from laboratory to clinic for transplanting bone marrow to persons whose own marrow has ceased to perform its critical function. Bone marrow supplies the daily requirement of new blood cells for the body.

In addition to promising a way for treating persons accidentally exposed to heavy doses of radiation, bone-marrow transplants "may conceivably lead to the development of a form of treatment for diseases . . . such

as leukemia and aplastic anemia," the report said.

In another facet of its busy year, AEC conducted research on the safe storage of high-level atomic wastes deep in earth formations. Storage in salt deposits appears promising and further research is now in progress. The petroleum industry has been requested to consider feasibility of locking up radioactive liquids in deep abandoned oil wells.

To help in storing "hot" wastes, a filter made of spaghetti-like strands of montmorillonite clay is being developed. It will filter out radioactive atoms from liquid wastes passed through it. After filtration, the clay is baked to "fix" the absorbed radiation prior to storage. On the commercial and industrial fronts, AEC reported that nuclear power plants may be able to generate power, using more advanced technology than at present, at seven to 8.5 mills per kilowatt hour. This would make them competitive with 20% to 25% of existing capacity on U.S. utility systems. As of September, 18 civilian power reactor projects, not that efficient, were in the works.

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PSYCHIATRY

Family Therapy Works

A MENTALLY ILL person is now often treated not alone as an individual but with his entire family as a group.

The differences between this kind of group treatment and the conventional kind of group therapy, in which a number of patients are treated together, were explained at the American Group Psychotherapy Association meeting in New York by Drs. Joseph H. Handlon and Morris B. Parloff of the National Institute of Mental Health, Bethesda, Md.

One great advantage of the conventional group therapy is that the patient loses his feeling of being different from everyone else. He comes to learn that he is in the same boat as many others, causing him to express his true feelings more openly.

With his family, however, the patient does not have this in-the-same-boat feeling. Instead, he is likely to feel quite alone as the only "sick one." He does not feel that he can speak frankly and freely.

In the conventional group, the therapist can protect the individual against having any other member of the group "get back at him," but the therapist cannot protect a patient from pressure from other family members after the patient has gone home.

In the conventional group, the individual patient can compare his way of handling a particular situation with that of other persons and can learn new ways of behaving. Family members, however, have often built up a traditional family way of treating outsiders and specific situations so

there is not the same opportunity to modify behavior.

In the family, too, there are built up expectations of how each member will act; "Mother is the forgiving one," "Sarah is always so dependable," "Dad never lets on what he is feeling," and so on.

These expectations make it very difficult for a patient in a family group to try out a new way of behaving.

Sometimes, at the core of the patient's illness is a misperception of his father—a misperception that is transferred to other persons. But this misperception may be reinforced by the attitude of the whole family. In the family group situation, it is hard to break up this unfortunate chain of attitudes.

Seeing a family operate together as a group is an extremely useful way of learning about the family pathology, the scientists reported. Under some circumstances, seeing the family in a group can have therapeutic results.

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PUBLIC HEALTH

October Milk Sampling Shows Strontium-90 Rise

THE STRONTIUM-90 levels in milk samples went up during October in all but the Atlanta station of the 12-station network, the U. S. Public Health Service reported.

The levels of radioactivity in the October

samples continued the fluctuating pattern that has prevailed from the beginning of the study in 1957. At the St. Louis station, the strontium-90 count was 25.1 micro-microcuries per liter. It was 15.0 in September.

The strontium-90 measurement at Fargo (N. D.)-Moorhead (Minn.) station was 11.4 in October compared with 8.1 in September. In the Chicago area, there was an increase from 5.2 in September to 10.1 in October.

U. S. Public Health Service suggested that these increases may be a repetition of the pattern observed during the fall of 1957 and 1958. They may also be related to the customary change in farm practices from pasture to barn feeding during the fall and winter months.

The National Committee on Radiation Protection and Measurements considers that undue risks to the population will not be incurred by continuing to use the value of 80 micro-microcuries per liter as a guide to whole population exposure. A curie is a measure of radioactivity equivalent to that produced by one gram of radium, and a micro-microcurie is one millionth of a millionth of a curie.

Both the monthly levels and the long-term averages for all radioactive isotopes analyzed in the milk samples collected in October from all stations remained below the levels that the committee considers permissible for lifetime exposure by the general population.

The milk sampling network is part of the Service's program of measurement of radioactivity in air, water and food. Milk was chosen for the initial study of specific isotopes in foods because it is the most practical to sample and is produced throughout the year in all sections of the country.

Science News Letter, February 13, 1960

GENERAL SCIENCE

Stamp Cancellation to Boost Science Fairs

IN SOME CITIES the simple act of mailing a bill, a birthday card or a love letter may increase public interest in developing a new generation of scientists.

The U. S. Post Office Department has authorized a "Support Your Local Science Fair" postal cancellation.

SCIENCE SERVICE, which administers the National Science Fair-International from its headquarters in Washington, was able to speed official approval of the design and national use of the special cancellation.

The device will be used this spring by any of the 200 fairs affiliated with the National Science Fair-International who apply through their local postmasters.

A joint committee of the Reading-Berks, Pa., Science Fair, and the Reading Stamp Collector's Club originated the idea.

The Reading Stamp Collector's Club, with a hundred members, including many scientists and other professional men, has sponsored junior groups of stamp collectors and has exhibited at community functions to demonstrate the knowledge and personal satisfaction to be gained from this rewarding hobby.

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RADIO

Messages Sent Via Moon

THE MOON will be used during periods of severe sun disturbances to relay radio messages for the Navy from Hawaii to the U.S. Naval Radio Station in Cheltenham, Md.

By sending ultra-high-frequency radio waves on a 480,000-mile round-trip to the moon, teletype messages and pictures reproduced by facsimile equipment can be transmitted when conventional radio communications are disrupted.

The value of the moon relay system was confirmed last November when a particularly bad disturbance in the earth's ionosphere blocked normal long-distance radio transmission. The Navy used its experimental set-up to get messages through.

About 100,000 watts of power are pumped from the radio transmitters into steerable antennas. The 84-foot dish antennas concentrate this power into a beam having an effective power of 400,000,000 watts.

It takes about two and a half seconds for a signal from Hawaii to reach Cheltenham. Radio frequencies of 435 to 445 megacycles per second are used.

A drawback of the system is that both

points must be able to view the moon at the same time. The moon thus can be used as a relay only once a day in a time band of three to 12 hours, depending upon the moon's orbital position with respect to the earth.

In wartime, it is believed the moon relay could offer a way of minimizing radio jamming opportunities available to the enemy. To jam a moon-relayed transmission, the enemy would have to be able to see the moon at the time when the message was being sent.

The \$5,500,000 system has separate transmitter and receiver installations at each terminal. Transmitters are at Annapolis, Md., and Opana, Oahu. Receivers are located at Cheltenham and at Wahiawa, Oahu.

Research into transmitting voice messages is scheduled but on lower priority to facsimile and teletypewriter transmission. The moon relay system will be used operationally "at discretion" when the circuit is not being used for research, the Navy said.

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ASTRONOMY

Radar to Sun and Back

A RADAR SIGNAL has been sent with the speed of light from earth to the sun and back, marking man's first direct contact with the sun.

The signal took 17 minutes to make the round trip to the star that is the center of the solar system, scientists at Stanford University's Radioscience Laboratory report in *Science* (131, 329, Feb. 5, 1960).

Drs. Von R. Eshleman and Philip B. Gallagher and Lt. Col. Robert C. Barthle of the Army Signal Corps, who is doing graduate work at Stanford, report the sun was very difficult to reach by radar because of the "thunderous radio noise arising from its turbulent surface," as well as its great distance, about 93,000 miles.

The solar radar echo did not come from the sun's visible surface, but from its outer corona, the pearly white upper atmosphere of the sun usually visible only at time of an eclipse.

The Stanford solar contacts were recorded on magnetic tape at daybreak, April 7, 10, and 12, 1959. Scientists have spent the intervening months analyzing the tapes, which contain nothing but unintelligible crashing sounds to the human ear, with the aid of an electronic computer.

The transmitter is a standard model, about the same as those for major commercial shortwave radio stations. The low frequency signal for radar of 25.6 megacycles was chosen to minimize signal absorption by the sun's corona.

The scientists hope to use radar techniques to learn more about solar flares and

similar violent eruptions on the sun that hurl streams of particles into space. Some of these particles trapped in the earth's magnetic field are thought to form the radiation belts expected to be a threat to manned space travel.

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EDUCATION

New Trends in Plans Of Teen-Aged Scientists

SIGNIFICANT new trends are indicated by the future professional plans of the year's most promising teen-aged scientists, with more than one-fifth of them looking forward to careers in physics and nearly three times as many boys as girls choosing science teaching.

Information released by SCIENCE SERVICE shows that 21% of the 448 outstanding high school seniors recently announced as members of the Honors Group of the 19 Science Talent Search hope to make contributions to modern physics.

Professional educators and scientists, as well as parents, may be cheered to learn that the 10% planning to teach science to the next generation include 32 boys and 13 girls.

Almost as many girls as boys are looking forward to careers in medical research and practice, with 29 boys and 22 girls making up the 11% choosing medicine.

Other scientific disciplines chosen by the

Science Talent Search Honors Group include special fields of engineering, 12%; chemistry, 9%; and mathematics and general research, 7% each.

Others of the group want to explore the biological sciences, electronics, biochemistry, rockets, psychology, astronomy, biophysics, dental science, geology, meteorology and geophysics.

The reasons these young persons give for their professional goals include the desire to make a contribution to human knowledge and progress, the appeal of unexplored possibilities, and the great personal satisfaction experienced in independent research.

The annual Science Talent Search is conducted by Science Clubs of America, an activity of Science Service, and is supported by the Westinghouse Educational Foundation.

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5,000-YEAR-OLD BRICK—This clay brick dates from the third dynasty, ruling 3,000 years ago in Ur of the Chaldeans. Presented to the American Institute of Architects by the Structural Clay Products Institute in Washington, D. C., it will be on permanent exhibit.

TECHNOLOGY

Ring Takes the Shake From Airplane "Skin"

AN ALUMINUM ring and a magnet can take 97% of the shake out of a metallic panel of airplane "skin" and thus reduce metal failure due to vibration fatigue.

Lloyd B. Cherry of Lamar State College of Technology, Beaumont, Texas, told the American Institute of Electrical Engineers meeting in New York that the aluminum ring is fastened to the inside of the skin panel to be protected. A permanent magnet, placed so its magnetic field engulfs the ring, is attached to the airplane frame.

When the skin vibrates, the aluminum ring moves back and forth in the magnet's field. This causes an electric current to flow in the ring, producing a second magnetic field. The new magnetic field reacts with the field of the magnet to restrain the aluminum ring from vibrating.

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BIOLOGY

Scientists Use Organisms To Wipe Out Insect Pests

THE GROWING resistance of disease-bearing insects to many of the chemical insecticides is prompting greater use of biological insect control.

Biological, or natural, control is checking insect growth by use of such natural parasites or predators as viruses, bacteria, fungi, nematodes (worms), protozoa, or other larger organisms.

Natural control has had a limited use for some time. The Japanese beetle, for example, is now largely controlled by a white spore dusted on lawns, which causes milky spore disease in the beetles and results in their death.

The introduction of effective chemical insecticides, such as DDT, in the control of insects resulted in a general abandonment of interest in natural control. Increased insect resistance to insecticides, however, and the fact that large-scale use of some insecticides has also killed off many organisms that normally feed on insect pests, have renewed scientific interest in natural control as a supplemental means of insect eradication or as a replacement for chemical means.

To review previous work in the field and to determine future research, an international group of scientists is meeting at Walter Reed Army Medical Center in Washington, D. C., to discuss "biological control of insects of medical importance."

Dr. Dale W. Jenkins of the U. S. Army Biological Warfare Laboratories, Fort Detrick, Frederick, Md., listed medically important insects and the most promising organisms of natural control. The insects included the mosquito, housefly, horsefly, blackfly, stablefly, tsetse fly, flea, louse, cockroach and tick.

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AGRICULTURE

Seaweed Meal Improves Tobacco Plant Quality

AROMATIC TOBACCO plants with improved leaf quality and higher sugar content have been raised in soil enriched with seaweed meal, it was reported.

The kelp-fed plants showed a significantly lower respiratory activity than plants not given kelp. A low respiratory rate implies less breakdown, and hence greater conservation, of sugar, which results in a better quality leaf.

In experiments at Clemson College, Clemson, S. C., under the direction of Dr. T. L. Senn, Norwegian kelp meal, *Ascophyllum nodosum*, was mixed with soil in aromatic tobacco plant beds at rates of 100, 200, 300, 400 and 500 pounds per acre.

Plants from the various lots, plus those from a control lot receiving no seaweed, were transplanted to the field and three successive leaf samples were taken. During early vegetative growth, the plants from beds having received 300, 400 or 500 pounds

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of kelp per acre had a significantly lower respiratory activity.

At the second sampling, a month later, the kelp-fed plants showed a lowered respiratory activity with greater influences being exerted at the higher rates. At the final sampling, late in the growing season, only the plants from the two higher rates showed significant reduction in respiratory activity.

There is evidence, Dr. Senn said, that seaweed in some way produces or stimulates plant hormones that act as regulators of plant growth and development. This was shown, he said, by altered enzymatic activity within the plant parts.

Assisting Dr. Senn were J. A. Martin, J. H. Crawford and B. J. Skelton, all of Clemson. Their findings were reported to the annual meeting of the Association of Southern Agricultural Workers in Birmingham, Ala.

Four treatments testing the effect of seaweed on pimento peppers were also reported by Dr. Senn. In one, no kelp was administered, in another, kelp was mixed into the soil at the rate of 200 pounds per acre, a third used a spray consisting of three teaspoons of kelp extract per gallon of water, and another combined the spray with the soil mixture.

The number of pods per plant increased to 2.7 in the plants that had been treated with kelp in one way or another, while the control plants had an average 1.5 pods per plant. Also, there was an increase in plant height from 10.6 inches in the control plants to 18.1 inches in the kelp-fed plants.

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ZOOLOGY

Australia Bans Export of Animals and Birds

KOALAS, platypuses and lyre birds can no longer be freely exported from Australia.

The Australian Government has also banned the export for commercial purposes of all other birds and animals native to Australia. Skeletons, skins and plumage of koala bears, platypuses and lyre birds can be exported only for scientific purposes. Exports for zoological purposes will be permitted only on a zoo-to-zoo basis and on the distinct understanding that no commercial trading will be involved.

The minister for customs, Senator N. H. D. Henty, said the export of Australian fauna in recent years had reached "considerable proportions."

Sir Edward Hallstrom, the former chairman of the Taronga Park Trust, said the ban on the commercial export of all Australian fauna was long overdue. Sir Edward, who presented the San Francisco Zoo with three koalas in 1959, said he had not intended to send any more koalas outside of Australia.

He had received hundreds of requests for Australian animals from all parts of the world.

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IN SCIENCE

MEDICINE

Muscular Dystrophy Slowed Down in Mice

MUSCULAR dystrophy in mice has been slowed down with a drug that is similar chemically to the male sex hormone testosterone, reports Dr. Robert M. Dowben of the Northwestern University Medical School. The drug, 17-alpha-ethyl-19-nortestosterone, also more than doubled the survival time of mice that had a hereditary disease closely resembling human muscular dystrophy. Clinical tests showed serious side effects in humans, however, Dr. Dowben reports. The drug increases synthesis of creatine, a substance needed for proper muscle function. Details of the research appear in *Nature* (184, 1966, Dec. 19, 1959), delayed in distribution in the U.S. due to a printers' strike.

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PEDIATRICS

Nation's Diaper Industry Forms Baby Care Council

A COURSE in baby sitting may soon be on the school curriculum, Dr. Ernest G. Osborne, chairman of the newly formed National Baby Care Council, said.

The course, designed to combat the growing problem of unskilled baby sitters and to safeguard infants, will be given with the cooperation of the nation's schools, parent-teacher associations and community service organizations, Dr. Osborne said. He is with the department of home and family life at Columbia University's Teachers College.

The council is preparing a film strip on baby sitting, a booklet for the young baby sitter to keep for study and reference, and an instruction manual to aid teachers and youth leaders in presenting the baby sitter program.

The baby sitter program is one of two immediate projects currently being sponsored by the National Baby Care Council. The other is a booklet on preventing diaper rash.

Entitled "Mother's Guide to Diaper Hygiene," the booklet is part of a nation-wide campaign to eliminate diaper rash, a skin ailment few infants escape. The booklet will be based on scientific and medical information and distributed to mothers through their physicians.

The diaper service industry is supporting the baby care council. Composed of representatives from medical, public health, education, nursing, social service and community organization fields, the council has as its aim to focus attention on the development and welfare of the baby from birth to about two years of age.

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SCIENCE FIELDS

BIOLOGY

Antimicrobial Compound Obtained From Sponge

THE "RED-BEARD" sponge, commonly found along the Atlantic coast of North America, apparently contains a potent antimicrobial agent.

The sponge extracts—the best one was obtained with ethyl ether from living sponge cell suspensions—are effective against microbes in the test tube. They also seem to be effective in the living animals, a team of researchers from the New York Aquarium report.

The extract, named Ectyonin by its discoverers, Ross F. Nigrelli, Sophie Jakowska and Idelisa Calventi, is "remarkable for its activity against a variety of microorganisms," they said. Growth of cultures of Gram-negative, Gram-positive and acid-fast forms was inhibited.

Of special interest is the extract's activity against *Pseudomonas pyocyanea*, the organism responsible for "blue pus."

In live animal tests of the extract, fish injected with both bacteria and a sesame oil suspension of the extract survived. Fish injected with bacteria alone died in a "relatively short time." Further tests, however, are needed to evaluate the live animal tests. The extract does not seem to be toxic to fish or mice. The studies are reported in *Zoologica* (44, 173, Dec. 31, 1959), published by the New York Zoological Society.

Microciona prolifera is the sponge's scientific name.

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ROCKETS AND MISSILES

Meteors Little Threat To Short Space Trips

METEORS, often seen on earth as "shooting stars" in the night sky, appear to pose little or no threat to the safety of a rocket ship or its crew on short trips.

Data obtained so far from the U. S. Explorer VII satellite, which has been up since Oct. 13, 1959, showed, at the end of the year, only one "hit" by a tiny particle on a special cell designed to check meteor impacts. This "hit," however, occurred in the launch phases of the rocket and scientists believe dust from the rocket itself, rather than a tiny meteor, caused the instrument to report a "hit."

Dr. Homer E. Newell of the National Aeronautics and Space Administration said information from Explorer VII so far indicates that micrometeors do not pose an engineering problem for short trips. Their threat on a two- or three-year trip, however, is unknown. Explorer VII is slated to stay up for about 20 years, but will transmit data back for only about a year from launch.

About 300 miles of taped telemetered signals were received from the satellite during 1959. Scientists reported that:

1. On two occasions, bursts of high intensity radiation were observed near the inner edge of the radiation belt that is fairly close to the earth.

2. A temporary rise in radiation was measured over North America on Oct. 18, 1959. It appeared to be tied in with a magnetic storm on earth that occurred between Oct. 16 and 20.

3. Greater swings in cosmic ray intensity were recorded at the satellite's 300- to 600-mile altitudes than on earth.

4. The satellite has spotted big storms, measuring 1,000 miles across, on the earth's sunlit side. Evidence indicates better instruments in the future will detect such storms on the earth's dark side. Explorer VII instruments are too crude to enable weathermen to predict weather from satellite readings yet.

5. Temperatures in space are easily handled. One transmitter has operated at temperatures between 60 and 64 degrees Fahrenheit. Skin temperatures, so far, have varied from a maximum of 128 degrees to about freezing.

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METALLURGY

New Method Speeds Metal Failure Prediction

A FAST WAY has been found to predict if a steel casting will develop tiny fractures inside that later might result in a steam turbine's blowing up in operation.

Developed by Dr. F. C. Hull, metallurgist at the Westinghouse research laboratories, Pittsburgh, Pa., the method reduces to minutes a check-out procedure that once ran into weeks and months and cost up to thousands of dollars in time and materials.

The new method checks "hot cracking" in small metal samples. Hot cracking sometimes occurs when steel and other metal alloys are subjected to the heat and stress of welding, or when a molten casting solidifies.

In contrast to the previous method, when a test slab sample weighing about 100 pounds was needed, the new method requires only a one-ounce metal sample. This small sample is melted by electromagnetic induction while held suspended in mid-air by a magnetic field.

In ten or 15 seconds, the white-hot molten metal is poured into the mold for a slightly tapered pin. The top and bottom of the pin lock into place to prevent normal contraction of the metal as it solidifies. The longer and slimmer the pin, the greater the tearing forces that are built up.

By comparing pins of different lengths and diameters, a scale is built up to describe the metal's susceptibility to hot cracking.

Dr. Hull has found that the tearing of a metal casting as it cools, and shrinks from a liquid into a solid, is comparable to the cracking of a weld as it freezes. Thus by studying the quickly cast metal samples, a laborious process of welding 100-pound test samples and checking for defects with a microscope is avoided.

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AGRICULTURE

Meat Tenderness Tested Before Animal Is Killed

IF YOUR STEAK has a pressure reading greater than 300 pounds per square inch, you had better get out a sharp knife. It is quite a tough cut.

A new hydraulic press, developed by the U.S. Department of Agriculture, can test raw meat right out of the slaughterhouse. It can also be used to test the tenderness of tiny samples of beef taken from the living animal. This means that meat packers, butchers and housewives can know how tender meat is before it is purchased.

Geneticists will also profit by the new device since they can use it as a guide in breeding animals with tender beef.

Readings on the tenderness tester, which takes cooked as well as raw meat, compare favorably with taste panel evaluations and with a device that measures cooked meat's tenderness. A reading up to 200 pounds per square inch means a tender cut; 200 to 300 psi, moderately tender; more than 300 psi, quite tough.

With the press, it should be possible to give a side of beef a rank in a "carcass tenderness index," said USDA meat technologists, Doris Sperring, W. T. Platt and R. L. Hiner. Meat tenderizers could also be better evaluated by checking tenderness before and after use.

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CHEMISTRY

Discovery Adds Clues to Composition of Lignin

THE SUGAR GLUCOSE is part of the answer to a biochemical riddle—the exact composition of lignin.

Lignin, which together with cellulose comprises wood, is a highly complex carbohydrate whose complete structure is unknown. It is considered a waste product even though most vanillin in this country is now made from it.

Some 20,000,000 tons of lignin are thrown away by the pulpwood industry each year.

Experiments at Fordham University under the direction of Dr. Friedrich F. Nord have shown that in Norway spruce trees the lignin is derived from glucose.

The discovery was made by feeding the trees with solutions containing radioactive glucose. The lignin formed by the trees was then isolated and found to contain the radioactivity originally present in the glucose.

By studying where the radioactivity was located in the lignin the scientists were able to find how the glucose molecules were converted into these units.

The significance of the discovery lies in the fact that scientists are now closer to determining the true composition of lignin. Thus, they may some day be able to find as many uses for lignin as they have for cellulose.

Assisting Dr. Nord were Dr. Walter J. Schubert and Samuel N. Acerbo.

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Arteries Cleared by Operation

A Los Angeles doctor has devised an operation that "sweeps" clogged arteries, which cause severe chest pain known as angina pectoris. Other advances are expected soon.

By HELEN BUECHL

WHEN YOUR CHIMNEY becomes so filled with soot that the smoke will not pass through, a man with special equipment can restore the passageway by sweeping it clean.

Why would not this same idea work for plugged-up arteries? A Los Angeles surgeon believes it could. He has perfected an operation that, in effect, renews the youth of such arteries in the heart. He is Dr. William P. Longmire Jr. of the University of California Medical Center.

He gathered together as patients relatively young men in the prime of life, between the ages of 38 and 54, who experienced such frequent and severe attacks of angina pectoris that they were unable to work and live a normal life. Angina pectoris results when the heart muscle fails to receive a sufficient supply of blood for nourishment. The result is extreme pain in the chest and left arm, plus a feeling of suffocation.

None of these "prime" patients had definite evidence of present or past coronary occlusion, nor its accompanying damage to the heart muscle known as myocardial infarction. But each man did have a typical history of severe anginal pain that was easily produced by the slightest effort or physical exertion. Tracings of the activity of each man's heart on an electrocardiogram made while each exercised had the tell-tale signs. Each man was diagnosed as a definite victim of coronary insufficiency with angina pectoris.

Clearing the Blockage

This meant that the heart muscle was being starved of its blood supply. The pain was its protest against this "blockade."

This pain is actually caused by coronary insufficiency, a blockage of the artery by deposits that cling to the inner lining of the artery. These deposits clog much as soot plugs chimneys.

Coronary insufficiency is not the same as coronary occlusion or thrombosis. A coronary thrombosis occurs when a blood clot lodges in such a manner as to shut off the flow of blood through the artery. The section of heart muscle it supplies "dies," at first softening like a weak spot on a tire's inner tube, and later, if the patient survives, forming tough scar tissue.

The operation, devised by Dr. Longmire, consists of reaming out the innermost layer of the artery, called the "intima," that is filled with fatty deposits known as atherosomatous plaques. These have been responsible for narrowing down the opening to

the point where the circulation has been almost cut off.

The operating technique to relieve this condition begins with the removal of the fat which surrounds the pericardium, or outer sac of the heart. This exposes the coronary arteries which course over the surface of the heart. The surgeon studies the condition of the fat he removes. It serves as a useful landmark because it tends to be scarred and adheres to the most diseased portions of the arteries, pointing out to the surgeon those areas of the arteries that need "sweeping out."

In addition to the condition of the outer surrounding fat, the diseased portions of the blood vessel feel hard and rigid, instead of normally elastic and pulsating.

Next, the surgeon checks the smaller branches of the artery. If they also are clogged, the operation cannot be effective, and so is not performed. These branches are tested by applying gentle pressure over the artery for from three to six minutes.

If there is no change in the color of the heart muscle supplied by the artery, or in the continuous electrocardiographic tracing, or in the heart's action, no blood is passing through and the artery is presumably closed up. However, a slight change in the ap-

pearance of any of these indicates that some blood was circulating, before pressure was applied, and the operation might increase the flow.

The vessel is then slit at the point where it is most rigid. The thickened and obstructing intima, now more of a core than a lining, is separated from the rest of the arterial wall for a little distance, then cut through and its ends tied.

The surgeon's technique calls for precision and delicacy, as a coronary artery is only about as thick as a piece of cooked spaghetti. With the aid of magnifying lenses, the surgeon slips a special loop over the end of the divided core, and by pushing gently back into the artery he can dissect out the atherosomatous inner layer, first in one direction from the incision, then the other, until there is a free flow of blood. A little powdered heparin sprinkled into the canal discourages clotting at that point, and the opening is sewed up with fine silk thread.

Results of Operation

The record for this operation includes four patients who found relief from pain, ranging from moderate to virtually complete, and who were then able to perform some work tasks.

These patients were obvious candidates for coronary thrombosis, or stroke, before the operation. Whether or not that will still occur, or whether improvement will



MECHANICAL HEART AND LUNG—This machine has assumed the duty of both the heart and lungs of more than 250 patients undergoing a heart operation. The machine was developed by Dr. Robert E. Gross of Children's Hospital, Boston.

be maintained, cannot be predicted. The first man was operated on late in 1957, so the period of postoperative observation has not been long in any case.

Dr. Longmire emphasizes that the operation is in the experimental stage; that it is indicated only in certain carefully defined cases; and that at this stage, it should not be thought of as a substitute for accepted methods of medical management of angina pectoris which is not wholly incapacitating to the individual.

Another advance has recently been made in the field of hypothermia. Surgeons know that by cooling the body's temperature, human requirements for oxygen and nourishment can be drastically reduced. In this low temperature state, the human heart can be stopped for a few precious minutes while the surgeon mends a vital defect.

Unfortunately the use of hypothermia presents several problems. If the body is cooled for too long a period, or at too low a temperature, brain damage can result due to insufficient oxygen supplies. However, a new technique has been devised which safely reduces the temperature of the body to 39.2 degrees Fahrenheit. At this temperature, the heart and circulation virtually stop spontaneously, and start up again when the blood is warmed. This method results in longer periods of time for the operations, and reduces the need for additional blood for the patient.

Wide Use of Machine

This operation is just one of the many techniques that modern medical science has devised for the ailing heart. Such modern equipment as the heart-lung machine has become common place in large hospitals throughout the country.

Dr. Robert E. Gross, surgeon-in-chief at Children's Hospital, Boston, and his associates developed such a machine with grants from the American and Massachusetts Heart Associations.

The machine has been used in more than 250 operations. It is efficient and keeps damage to the blood at such a minimum that it can be used on two patients in succession with only one priming of donated blood.

Despite these advances in operating and mechanical techniques, America's number one killer, heart disease, is not itself ready to die. Researchers in the fields of heart and kidney diseases are striving to devise methods of controlling many of the various forms of circulatory and renal diseases.

Scientists are now working on methods of dissolving clots already formed in the blood vessels. Operations, similar to Dr. Longmire's, are being performed on experimental animals in an attempt to discover methods of increasing blood flow. Much research is in progress to improve the plastic valves now replacing worn-out valves in the heart.

Preventive medicine is important in heart disease control too. If the factors that cause heart disease can be avoided, the annual death toll will drop drastically. Repeated attacks of rheumatic fever can now be prevented by continued use of drugs. Currently, scientists are attempting to isolate the factor that causes the initial attack.



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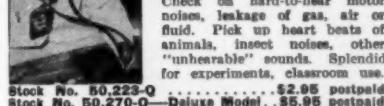
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AERONAUTICAL DICTIONARY—Frank Davis Adams—*NASA (GPO)*, 206 p., illus., \$1.75. Defines about 4,000 aeronautical terms, not including space technology.

AMMONIA: Manufacture and Uses—A. J. Harding—*Oxford Univ. Press*, 41 p., illus., \$1.05. Describes modern industrial conditions.

AVAILABLE ENERGY AND THE SECOND LAW ANALYSIS—Edward A. Bruges—*Academic*, 124 p., \$5.50. Thermodynamic analysis based on the concept of available energy.

THE CONTROL OF GROWTH AND FORM: A study of the Epidermal Cell in an Insect—V. B. Wiggleworth—*Cornell Univ. Press*, 140 p., illus., \$3. Six essays presenting the principles of physiological control of growth and form in animals.

A DIDEROT PICTORIAL ENCYCLOPEDIA OF TRADES AND INDUSTRY: Manufacturing and the Technical Arts in Plates Selected from "L'Encyclopédie ou Dictionnaire Raisonné des Sciences, des Arts et des Métiers, 2 Vols.—Denis Diderot, introd. by Charles Coulston Gillespie, Ed.—*Dover*, 920 p., 485 plates, 9 x 12, \$10 each; two vol. boxed set \$18.50.

THE EDUCATION OF THE SCIENTIST IN A FREE SOCIETY—Edward Teller and others, introd. by A. Bernard Drought—*Marquette Univ. Press*, 88 p., paper, \$2.50. Conference papers commemorating the 50th anniversary of College of Engineering, 1959.

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EVERGREENS FOR EVERY STATE: How to Select and Grow Them Successfully in Your Locality—Katharine M.P. Cloud—*Chilton Co.*, 227 p., 82 photographs, climatic zone map, \$4.95.

FACULTY AND OTHER PROFESSIONAL STAFF IN INSTITUTIONS OF HIGHER EDUCATION: First Term 1957-58—Wayne E. Tolliver and Hazel C. Poole—*Off. of Educ. (GPO)*, 68 p., paper, 45¢.

FLORA OF ALASKA and Adjacent Parts of Canada—J. P. Anderson—*Iowa State Univ. Press*, 543 p., illus., \$8.50. Illustrated descriptive text of all vascular plants known to occur within the region.

GEORGE EASTMAN: Young Photographer—Joanne Landers Henry—*Bobbs*, 192 p., illus. by M. Rawson, \$1.95. Juvenile biography.

AN INTRODUCTION TO KANSAS ARCHAEOLOGY—Waldo R. Wedel—*Smithsonian Inst. (GPO)*, 723 p., illus., paper, \$3. With description of the skeletal remains from Doniphan and Scott counties, Kansas, by T. D. Stewart.

MATERIALS AND TECHNIQUES FOR ELECTRON TUBES—Walter H. Kohl—*Reinhold*, 638 p., illus., \$16.50. Completely revised edition of "Materials Technology for Electron Tubes."

MINERALS OF NEW MEXICO—Stuart A. Northrop—*Univ. of N. Mex. Press*, rev. ed., 665 p., \$10. Reflects the great changes in the knowledge and economics of New Mexico's minerals since World War II.

PHYSICAL METALLURGY OF STRESS CORROSION FRACURE: Symposium 1950-1959—Thor N. Rhodin, Ed.—*Interscience*, 394 p., illus., \$13. Metallurgical Society Conferences, Vol. 4.

PRE-ADOLESCENT: What Makes Them Tick?—Fritz Redl—*Child Study Assn.*, rev. ed., 26 p., paper, 25¢. Helpful suggestions for adults.

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SCIENCE AND THE HUMANITIES—Frederick Burkhardt—*Antioch Press*, 27 p., paper, 50¢. Antioch College Founders Day lecture.

SEMICMICRO EXPERIMENTS IN GENERAL CHEMISTRY AND QUALITATIVE ANALYSIS—Nicholas D. Cheroris and Herman Stein—*De Graaf*, 310 p., illus., by E. Gomberg, paper, \$4. Guide to experimentation, using small scale equipment.

THE STORY OF EARLY MAN: Human Evolution to the End of the Stone Age—H. E. L. Mellersh—*Viking*, 257 p., illus. by Sally Mellersh, \$4.50. Traces the long, slow evolution of man's early inheritance, in body, brain, sensitivity and environment.

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THEORY OF MECHANICAL VIBRATION—Kin N. Tong—*Wiley*, 348 p., \$9.75. Broad treatment of linear mechanical vibrations, using modern analytical concepts.

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Science News Letter, February 13, 1960

Do You Know

Antarctica with 5,500,000 square miles is 21 times as big as Texas.

The Navy has used underwater television equipment in ocean-bottom surveys at depths of more than 600 feet.

Fall enrollment of full-time and part-time students in the nation's colleges and universities for the 1959-60 scholastic year reached the all-time high of 3,402,297, including 2,173,797 men and 1,228,500 women.

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ROCKETS AND MISSILES

Vanguard Studies Show "Mumetal" for Satellites

SPECIAL magnetic-shielding metals have been suggested as rudders to help guide man-made satellites in their flights through space.

Studies of the flight of Vanguard II, launched almost a year ago on Feb. 17, 1959, showed that its rotation was being slowed down at an extremely rapid rate, Dr. Raymond H. Wilson Jr. of the National Aeronautics and Space Administration reported in Washington, D. C.

An explanation for this is seen in the fact that the permanent magnets in this satellite were each surrounded in all except one direction by magnetic shielding of "mumetal" or other high-permeability material. This material would ordinarily experience an extremely high binding force or couple with respect to a rotating magnetic field such as the earth's, Dr. Wilson explained.

In fact, he said, if the mumetal had not been well-saturated by the magnets inside Vanguard, the satellite's rotational motion would have been completely left to the "local vagaries of the earth's magnetic and gravitational fields" after about one day.

This remarkable sensitivity of highly permeable magnetic material to its surrounding field suggests its possible use for controlling the orientation of satellites, Dr. Wilson concluded. The Vanguard results show that if the satellite's outer shell had been of mumetal, it would have become directionally "locked" in the earth's field within one second.

The NASA scientist suggests that properly designed and placed rings of mumetal could be used as rudders in addition to the more complicated gyroscope devices for controlling the direction of space observatories.

Details of the study appear in *Science* (131, 223, Jan. 22, 1960).

Science News Letter, February 13, 1960

PUBLIC SAFETY

AEC Recovers 569 Radioactive Watches

A TOTAL of 569 of those wrist watches suspected to be radioactive have been discovered and returned to the American distributor in New York City.

Last Dec. 17, the Atomic Energy Commission announced it and the American Rolex Watch Corporation were taking steps to recover 600 Rolex GMT-Master wrist watches imported from Switzerland and sold in this country between October, 1956, and November, 1959. A number of these watches were purchased abroad by United States citizens and brought back to this country.

Of the 569 now returned, 432 were found to contain radioactive strontium-90 in markings and numerals. The company is replacing all such bearing parts and returning the watches without charge to the owners, a statement from the Atomic Energy Commission revealed.

Two hundred thirty of the 569 recovered watches were originally sold in the U. S.

Science News Letter, February 13, 1960

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ASTRONAUTICS

Urge Space Probe to Test For Possible Martian Life

A SPACE PROBE passing within some 600,000 miles of Mars might show if life exists on the planet.

The probe could scan Mars, sending back to earth information about the spectra in the three to seven micron region, two California Institute of Technology scientists reported to the first International Space Science Symposium in Nice, France. The spectra would be correlated with the visual light and dark areas of Mars, Drs. Richard W. Davies and Max Gumpel said.

Even if not more than a few thousand "bits" of information were transmitted to earth, the experiment would be "significant," Dr. Davies reported.

This is because the earth's atmosphere blocks most of the infrared light in the spectrum band between one and 100 microns. Some breaks in this atmospheric block have already permitted detection of what may be carbon-hydrogen bond molecules on Mars, indicating the existence of organic life.

Origin of the organic molecules is still an open question, the Caltech scientist said. More infrared reflection spectra of biological materials are needed, particularly in spectral regions where molecules of biological origin have very definite characteristics. Two strong reflection peaks due to carbon-oxygen stretching have been found in the six micron region. This region on Mars could only be tested with a space probe since it is blocked by the earth's atmosphere.

Another suggested space probe experiment is measuring the light polarization of Mars. A single pass around Mars could result in polarization measurements that would give important information on the sizes of particles in the Martian atmosphere, the scientist said.

Science News Letter, February 13, 1960

Questions

AGRICULTURE—How does seaweed meal improve growth and development of tobacco plants? p. 104.

GENERAL SCIENCE—What research for safe storage of atomic wastes was conducted by the AEC in 1959? p. 102.

LINGUISTICS—What is "predictive analysis"? p. 99.

PHYSICS—What is the estimated thickness of the earth's inner radiation belt? p. 101.

SURGERY—What is coronary insufficiency and how does it differ from coronary occlusion or thrombosis? p. 106.

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Where to Retire or Vacation

at what look like prewar prices—and where no one ever heard of nerves or worries

These Are America's Own Bargain Paradises

Norman Ford's new book *Off-the-Beaten Path* names the really low cost Florida retirement and vacationing towns, the best values in Texas, the South-West, California, the South and East, Canada—and a dozen other areas which the crowds have not yet discovered.

—Fabulous places like that undiscovered region where winters are as warm and sunny as Miami Beach's yet costs are two-thirds less. Or that island that looks like Hawaii yet is 2,000 miles nearer (no expensive sea or air trip to get there). Or those many other low-cost-actually beautiful spots all over the United States and Canada which visitors in-a-hurry overlook (no costs are low and stay low).

Every page of *Off-the-Beaten Path* opens a different kind of vacationing or retirement paradise which you can afford—places as glamorous as far-off countries yet every one of them located right near at hand. Like these:

• France's only remaining outpost in this part of the world—completely surrounded by Canada's territory—or a village more Scottish than Scotland—or age-old Spanish hamlets right in our own U.S., where no one ever heard of nervous tension or the worries of modern day life.

• Resort villages where visitors come by the score, so you always meet new people . . . but they never come by the thousands to raise prices or crowd you out.

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You read of island paradises aplenty in the United States and Canada, of art colonies (artists search for picturesque locations where costs are low), of areas with almost a perfect climate or with flowers on every side. Here are the real U.S.-A.-brand Shangri-Las made for the man or woman who's had enough of crowds. Here, too, are unspoiled seashore villages, tropic-like islands, and dozens of other places where you can get a real retirement vacation at some of the lowest prices you've heard of since the good old prewar days. They're all in the United States and Canada, and for good measure you also read about the low-cost paradises in Hawaii, the Virgin Islands and Puerto Rico.

Off-the-Beaten Path is a big book filled with facts that open the way to freedom from tension and a vacation or retirement you can really afford. About 100,000 words and plenty of pictures. Yet it costs only \$2.

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PLASTIC STEPLADDER consists of aluminum rungs bonded into siderails of plastic reinforced by glass fiber. The 35-pound ladder may be used as a 10-foot stepladder, a 20-foot extension ladder, or two 10-foot straight ladders.

Science News Letter, February 13, 1960

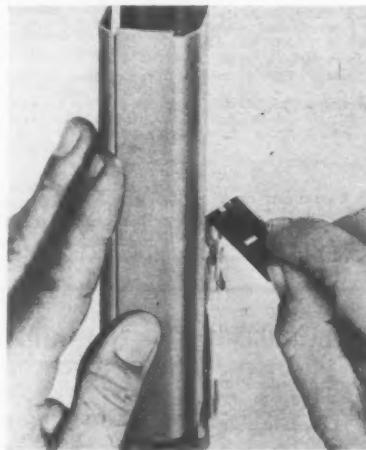
INDUSTRIAL EYE GUARD can be worn comfortably, even over prescription eyeglasses, for many hours. The wide brow rest and .080-inch-thick lens are of one-piece construction. The one-ounce guards are available with green or clear lenses.

Science News Letter, February 13, 1960

CONTAMINATION METER can be used for measurement of small traces of atmospheric contaminants such as hydrogen sulfide, sulfur dioxide, carbon dioxide, chlorine and ammonia. The instrument can measure any gas or vapor that will ionize in water, or those gases whose decomposition products on heating will ionize in water.

Science News Letter, February 13, 1960

PAINT SCRAPPING GUIDE, shown in the photograph, permits faster and neater painting of door and window frames. Adjustable to three different positions, it fits over and against the painted framework



and serves as a guide for removal of excess paint with a razor blade. At the same time, the steel guide allows a certain amount of paint to remain on the glass as a weather seal between it and the frame.

Science News Letter, February 13, 1960

SHOCK ABSORBER TOOL features a new and faster way to remove and install bayonet type shock absorbers in automo-

biles. The short member of the "T"-shaped tool fits over the bayonet of the shock and holds it while the retaining nut is removed or replaced. The threaded stem end screws on the shock over the bayonet so that new shocks can be pulled up through the coil spring.

Science News Letter, February 13, 1960

PORTABLE AIR COMPRESSOR for farm and ranch use can be rolled to the job to provide up to 150 pounds per square inch of air pressure for spraying of paint and insecticides, powering of air tools, cleaning of equipment, maintenance of tires, and for a variety of other applications.

Science News Letter, February 13, 1960

NO-MORTISE HINGES allow home owners, carpenters and industrial maintenance men to eliminate difficult and time-consuming mortising in hanging all types and sizes of doors. The steel hinges feature five-knuckle, loose-pin construction, and are available in four sizes.

Science News Letter, February 13, 1960

SHELL MANICURE SET of plastic consists of a shell holder, forged cuticle scissors, a cuticle pusher, a nail cleaner and a file. Metal parts are of quality tempered steel. The set stands 4½ inches high.

Science News Letter, February 13, 1960



Nature Ramblings



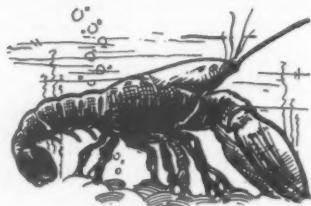
By HORACE LOFTIN

WHEN SOMETHING happens to a person's sense of balance, so that he cannot stand without toppling over, this person is "out of the running." He simply must go to bed until his balance is restored. All wild creatures whose sense of balance is impaired can expect a quick death.

From protozoa to man, almost every animal that moves about in its environment must be something of a tightrope walker. Some creatures solve the problem of staying right-side up simply by not having a "right" side. The one-celled paramecium, for example, swims in a corkscrew-shaped path, and no one side need be uppermost for the proper functioning of the animal. Some lesser animals may keep their balance merely by having the lower portion of the body heavier than the top.

Up the ladder of evolution, the jellyfish are among the first to develop true organs of equilibrium. At the margins of the jellyfish's body are hollow cells containing tiny granules. If the jellyfish tips to one

Telling Up From Down



side, the granules roll over, stimulating nerve endings which "tell" the animal it is off balance.

This kind of arrangement is found in more complicated form among many higher animals. Mollusks such as the snail have a hollow organ (the statocyst) in which a limy particle (the statolith) rests among hair-like sensory cells. When the snail's body goes up or down, the little particle tilts and indicates the body position in respect to gravity. In crustaceans, such as the shrimp (shown in the illustration), tiny

grains of sand are used as the balance particles. When the crustacean molts its old shell for a new one, the grains of sand are lost. Until new sand enters the balance organ, the molting crayfish has trouble telling up from down!

Among the backboned animals, including man, the inner ear is the organ of equilibrium. This typically consists of three fluid-filled canals, each in the form of a semi-circle. When an animal tilts in one direction or the other, the fluid in these canals rushes forward or backward, up or down. This moving fluid sets off nerve impulses which "tell" the brain about the balance of the body.

Each of these semicircular canals also has a swelling (ampulla) containing limy particles on sensory "hairs." These act similarly to the balance organs of the more primitive animals. In fish, a new layer of limy material is placed over the balance particles each growing season, so that by counting the rings of the particles the age of the fish can be estimated.

Science News Letter, February 13, 1960